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**REMARKS**

Claims 6 and 8-15 are pending in this application. Claim 7 has been canceled without prejudice or disclaimer, claims 6, 9 and 11 have been amended, and new claims 12-15 have been added.

The limitation of canceled claim 7, regarding the "addition polymerized polymer", has been incorporated into claim 6, and claim 6 has been amended for clarity, as discussed below. The dependency of claims 9 and 11 has been correspondingly amended.

The term "addition polymerized polymer" does not mean any polymer which is used additionally or "additional polymer". However, "addition polymerized polymer" is synonymous with "addition polymer", which is defined as a "polymer formed by the direct addition or combination of the monomer molecules with one another" (see *Hawley's Condensed Chemical Dictionary*, 14th ed., rev. by Richard J. Lewis, Sr., John Wiley & Sons, Inc., New York 2001, p. 21, copy attached).

According to the specification, on page 24, line 24, to page 26, line 2, the addition polymerized polymer in the present invention is a thermoplastic resin which exerts desired effects such as conferment of low profile feature on the unsaturated resin and the unsaturated monomer, and improvement of physical properties (fracture toughness, etc.).

An additional limitation regarding the amount of the graft polymer is also added to claim 6. This limitation is supported by page 15, line 24, of the specification.

Support in the specification for the new claims is discussed below.

**Claims 6-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

The Examiner states that it is not clear if principal chain (A1) consists of a copolymer of styrene and (meth)acrylate in which styrene is a principal component.

The rejection is overcome by the amendment to claim 6. Claim 6 has been amended to clarify to recite "principal chain (A1) that is a copolymer comprising (meth)acrylate repeat units and the styrene repeat units". In addition, for clarity, the term "monomer" in "styrene monomer" and "(meth)acrylate monomer" is changed to "repeat units".

**Claims 6-11 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hoene (U.S. Patent No. 4,172,102).**

Reconsideration of the rejection of claims 6-11 over Hoene is respectfully requested.

One of the distinctive features of the present invention resides in the discovery of graft copolymers of specific structures as useful components (compatibilizing agents) in radical copolymerizable unsaturated resin compositions, the graft copolymer being able to improve compatibility between an addition polymerized polymer (thermoplastic resin) as a low profile additive (which means an additive which prevents resin from contraction when cured) and a radical copolymerizable unsaturated resin (See Specification, page 1, lines 6-11).

The constitution of the present invention is compared with that of Hoene in the following table.

Present Invention (Claim 6)	Hoene (Claim 1)
A radical copolymerizable unsaturated resin composition comprising	An unsaturated polyester molding composition which is curable in the presence of a polymerization initiator and comprises a mixture of
_____ a compatibilizing agent,	—
_____ an addition polymerized polymer,	—
_____ a radical copolymerizable unsaturated resin, and	(a) one or more ethylenically unsaturated copolymerizable polyesters,
_____ a polymerizable unsaturated monomer,	(b) one or more ethylenically unsaturated copolymerizable monomeric compounds, the proportion by weight of a:b being 80:20 to 30:70, and

Present Invention (Claim 6)	Hoene (Claim 1)
<p>wherein the compatibilizing agent is a graft copolymer (A) which contains a styrene <u>monomer repeat units</u> as a principal component, <u>and has said graft copolymer (A) having:</u></p> <p><u>_____ a principal chain (A1) consisting of that is a copolymer with comprising a (meth)acrylate monomer repeat units and the styrene repeat units; and</u></p> <p><u>_____ a side chain (A2) selected from a ring-opening polymerized polyether side chain consisting of a polyoxyalkylene ether, a polyester side chain, and a polycarbonate side chain,</u></p> <p><u>_____ the side chain (A2) being bonded to the principal chain (A1), and</u></p> <p><u>_____ the amount of the graft copolymer (A) being within a range of 0.1-10 parts by weight based on the total of the amount of the radical copolymerizable unsaturated resin and the amount of the addition polymerized polymer as 100 parts by weight.</u></p>	<p>(c) <b>a polyalkylene ether copolymer</b> in an amount of 0.1 to 25% by weight, based on the total weight of components a and b, wherein the polyalkylene ether copolymer has a molecular weight of between about 1,000 and 1,000,000 and <b>is a graft polymer mixture or copolymer mixture</b>, or a mixture of these, which graft polymer mixture or copolymer mixture is obtained by free radical polymerization of ethylenically unsaturated polyalkylene ethers and one or more ethylenically unsaturated monomers in a proportion by weight of ethers:monomers of 0.5:99.5 to 30:70.</p>

In Hoene, the polyalkylene ether copolymer (c) is a low profile additive. In order to make this low profile additive compatible with an unsaturated resin, the low profile additive (polyalkylene ether copolymer (c)) is obtained by modifying an addition polymerized polymer.

It is apparent that the polyalkylene ether copolymer (c) in Hoene is a low profile additive since a preferable amount of the polyalkylene ether copolymer (c) based on the total weight of components (a) and (b) is 10 to 20% by weight according to column 8, line 53, which is comparatively large. Furthermore, this is also apparent since a polyalkylene ether copolymer as

much as 40 parts by weight with respect to the amount of components (a)+(b) (solution of unsaturated resin in styrene) is used in Example 5 of Hoene (column 13, line 20 *et seq.*).

In addition, the polyalkylene ether copolymer (c) in Hoene is not an essential component according to column 9, lines 35-42, of Hoene.

On the other hand, the present invention is based on the finding of specific graft copolymers as compatibilizing agents, after thorough research for ingredients which can compatibilize unsaturated resins and low profile additives. The amount of the graft copolymer to be added is "preferably within a range of 0.1-10 parts by weight, and more preferably within a range of 0.5-3 parts by weight", as disclosed in the specification, page 15, lines 20-25, which is a comparatively small amount. In the above amendment, the amount of the graft copolymer (A) is limited to 0.1-10 parts by weight in claim 6.

The present invention is further distinguished from Hoene by the incorporation of the addition polymer (claim 7) and the limitation of the amount of the graft polymer (A) into claim 6.

In conclusion, Hoene relates to molding materials in which a shrinkage-reducing (low profile) additive itself is modified for improved compatibility. In contrast, according to the present invention, a compatibilizing agent (graft polymer) of a specific structure is added in order to improve compatibility with general-purpose low profile additives. Although an object of the present invention to improve uniformity of molded articles is similar to the object of Hoene, the approach which the present invention takes in order to address the object completely differs from that of Hoene.

Applicants therefore submit that claims 6 and 8-11, as amended, are novel and non-obvious over Hoene.

**Claims 1-5 [sic] are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hesse et al. (U.S. Patent No. 4,670,485).**

Applicants respectfully note that the rejection of claims 1-5 is improper, since claims 1-5 were not pending in this application. Applicants here address the rejection under the assumption that it represents a rejection of claims 6-11.

Hesse et al. discloses hardenable polyester molding materials which contain a mixture of I. an ethylenically unsaturated polyester or a terminally unsaturated vinyl ester; II. ethylenically unsaturated monomers copolymerizable with I; III. from 6 to 25% by weight, based on I +II, of a graft polymer P, in which there are grafted, onto A. from 5 to 95% by weight of an elastomeric polymer having a glass transition temperature of below 0° C; B. from 95 to 5% by weight of a polyadduct, polycondensate or acrylic polymer which contains olefinic double bonds and has a glass transition temperature of above 0° C; with or without C. from 0 to 90% by weight of vinyl monomers, the percentages totaling 100; and IV. from 5 to 300% by weight, based on I+II, of fibrous reinforcing agents; with or without V. conventional initiators, polymerization accelerators, inhibitors, lubricants, inert solvents, fillers, thickeners and shrinkage-reducing additives (column 2, lines 41-63).

The Examiner refers to Hesse as teaching a composition comprising an unsaturated resin, an unsaturated monomer and a graft polymer meeting the limitations of claim 6. The Examiner has

taken Hesse's component III, which is disclosed as graft polymer P (column 4, line 60) as providing the graft polymer of the present invention.

Hesse's graft polymer P is made from rubber (A), polymer (B) and optionally vinyl monomer (C). The reference states starting at column 4, line 61:

"Suitable rubbers (A) for the preparation of the graft polymer P are commercial rubbers as listed, for example, in The Synthetic Rubber Manual, 8th edition, 1980, of the International Institute of Synthetic Rubber Producers Inc., as well as natural rubbers. As categories of compounds there may be mentioned polydiene, polychloroprene, polybutyl, polynitrile and ethylene/.alpha.-olefin/diene (EPDM) rubbers, as well as random copolymers of dienes and copolymerizable vinyl monomers, e.g. SBR rubber, polyacrylate rubber and ethylene/vinyl ester copolymers. Preferred rubbers are polydienes which may or may not PG,9 contain functional groups, block polymers which contain polydiene blocks, in particular made up of styrene and/or acrylonitrile blocks and of butadiene and/or isoprene blocks, as well as SBR, EPDM rubbers and polyacrylates."

Group (B) of the graft copolymer may be polyesters, etc., as listed in column 5, lines 55-64.

That is, the rubber may contain polydiene blocks made up of styrene, but there appears to be **no general teaching** in the reference that styrene is the principal component, or that the principal chain is a copolymer of styrene and methacrylate. As such, there appears to be no general teaching or suggestion in Hesse for the graft copolymer (A) of claim 6.

The Examiner refers to Hesse's examples, but does not indicate which specific examples are being cited. Graft copolymers P1 through P9 are disclosed in columns 10-12. Of these, only P1, P2, P5, P6, P7 and P9 contain vinyltoluene or styrene. In P1, the vinyltoluene structure portion of the polymer is 14%. In P2, P5, P6, P7, P8 and P9, the polystyrene portion is 53%, 23%, 35%, 51% and 54%, respectively; of these, only P2, P8 and P9 appear to have styrene as the principal component. Moreover, none of P2, P5, P6, P7, P8 and P9 appears to have a methacrylate component.



Therefore, the Examiner appears to be referring to rubber graft polymer A. This graft copolymer is made from 300 parts butadiene-acrylonitrile copolymer containing 80% of butadiene, 100 parts of prepolymer 1 (the block polyether), 100 parts of p-vinyltoluene, 60 parts of methyl methacrylate and 40 parts of acrylic acid.

However, rubber graft polymer A **does not meet** the limitations of claim 6. First of all, the styrene component (p-vinyltoluene) is only  $100 / (100 + 300 + 60 + 30)$  of the components other than prepolymer 1, so the styrene is not a principal component and the vinyltoluene structure portion of the polymer is 14%, so the styrene is not a principal component. Therefore, rubber graft polymer A cannot provide the graft copolymer of claim 6, and this example cannot anticipate the present claims.

That is, the compatibilizing agent of the present invention is distinguishable from rubber graft copolymers. Shrinkage-reducing additives exemplified in column 8, lines 54-59, of Hesse are comparable with the low profile additives of the present invention.

The constitution of the present invention is also compared with that of Hesse in the following table.

Present Invention (Claim 6)	Hesse (Claim 1)
A radical copolymerizable unsaturated resin composition comprising	A hardenable polyester molding material which comprises a mixture of
_____ a compatibilizing agent, (graft polymer)	—
_____ an addition polymerized polymer,	—
_____ a radical copolymerizable unsaturated resin, and	I. An ethylenically unsaturated polyester or a terminally unsaturated vinyl ester,

Present Invention (Claim 6)	Hesse (Claim 1)
_____ a polymerizable unsaturated monomer, ...	II. ethylenically unsaturated monomers copolymerizable with I,
—	III. from 6 to 25% by weight, based on I+II, of a graft polymer P, ... and
—	IV. from 5 to 300% by weight, based on I+II of fibrous reinforcing agents.

Applicants further note that the “addition polymerized polymer” of claim 6 further distinguishes the present invention from Hesse et al.

Applicants therefore submit that claims 6 and 8-11 are novel and non-obvious over Hesse et al.

**Regarding the new claims**

New claims are added, according to which the characteristics of the graft polymer (A) in the present invention are further distinguishable from those of Hoene, as described in the following table.

	Compatibilizing Agent (Graft Polymer (A)) in the Present Invention		Polyalkylene Ether Copolymer in Hoene
	Claim	Support in Specification	
Principal Chain (A1)	<u>Claim 12</u> 70-99.9 wt% styrene repeat units and 0.1-30 wt% other unsaturated monomer including (meth)acrylate repeat units	page 14, lines 1-4	Ethylenic unsaturated monomer is used, such as styrene, methyl (meth)acrylate, vinyl acetate, 2- ethylhexyl acrylate, and acrylic acid as in Examples
Side Chain (A2)	<u>Claim 13</u> 60-100 wt% oxyethylene units	page 10, lines 19-21	Claim 8 recites that polyalkylene ether copolymer may consist of polymerized units of ethylene oxide or ethylene oxide and propylene oxide
Weight Ratio (A1/A2)	<u>Claim 14</u> 70/30-30/70 (wt%)	page 14, lines 5-13	Column 7, line 36, discloses 99.5/0.5 to 70/30, preferably 99/1 to 80/20 (wt%)
Amount of (A) (by weight)	<u>Claim 15</u> 0.5-3 parts based on the total of radical copolymerizable unsaturated resin and addition polymerized polymer as 100 parts	page 15, line 20, to page 16, line 1	Claim 1 recites 0.1-25 wt% based on a+b. Column 8, line 53, discloses 10- 20 wt% based on a+b.

Amendment Under 37 CFR 1.111  
Takashi YASUMURA et al.


U.S. Patent Application S.N. 10/073,926  
Attorney Docket No. 001514A

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the pending claims are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,  
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Enclosures: *Hawley's Condensed Chemical Dictionary* (14<sup>th</sup> Ed.) pgs. 21 and 898

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